

SN. 10/670,158

ATTORNEY DOCKET NO. KIOI:038

IN THE CLAIMS

*The status of the claims as presently amended is as follows:*

1. (Currently Amended) A vehicle rapid deceleration detection device, comprising:

a rotation sensor which generates a vehicle speed pulse signal in synchronism with a vehicle speed;

an elapsed time measuring unit which measures an elapsed time from a time the vehicle speed pulse signal is input[[ted]];

a vehicle speed calculating unit which calculates the vehicle speed from the interval of said vehicle speed pulse signal;

a vehicle speed memory unit which stores a determined vehicle speed at a prior predetermined time;

a deceleration pulse interval calculating unit which calculates a pulse interval corresponding to a predetermined deceleration relative to the determined vehicle speed at the prior predetermined time stored by said vehicle speed memory unit; and

a rapid deceleration determining unit which determines rapid deceleration of the vehicle;

wherein said rapid deceleration determining unit compares the elapsed time measured by said elapsed time measuring unit with the pulse interval calculated by said deceleration pulse interval calculating unit, and when the elapsed time is longer than the pulse interval, determines that the vehicle has rapidly decelerated.

2. (Currently Amended) A vehicle rapid deceleration detection device, comprising:

a rotation sensor which generates a vehicle speed pulse signal in synchronism with a vehicle speed;

an elapsed time measuring unit which measures an elapsed time from a time the vehicle speed pulse signal is input[[ted]];

an undetermined vehicle speed calculating unit which calculates an undetermined vehicle speed from the elapsed time from the time the vehicle speed pulse signal is input[[ted]], measured by said elapsed time measuring unit, to the present time;

a vehicle speed calculating unit which calculates the vehicle speed from the interval of the vehicle speed pulse signal;

a vehicle speed memory unit which stores the present determined vehicle speed; and

a rapid deceleration determining unit which determines rapid deceleration of the vehicle;

wherein said rapid deceleration determining unit, using the present determined vehicle speed stored by said vehicle speed storage unit, the undetermined vehicle speed calculated by

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said undetermined vehicle speed calculating unit, the elapsed time measured by said elapsed time measuring unit, and the present determined pulse interval based on which said present determined vehicle speed is calculated, calculates a deceleration representing the slope of a vehicle speed change by dividing the difference between the undetermined vehicle speed and present determined vehicle speed, by a time width calculated based on the present determined pulse interval and said elapsed time, and determines that the vehicle has rapidly decelerated when the calculated deceleration has reached a predetermined threshold value.

3. (*Currently Amended*) A vehicle rapid deceleration detection device, comprising:

- a rotation sensor which generates a vehicle speed pulse signal in synchronism with a vehicle speed;

- an elapsed time measuring unit which measures an elapsed time from a time the vehicle speed pulse signal is input[[ted]];

- a vehicle speed calculating unit which calculates the vehicle speed from the interval of the vehicle speed pulse signal;

- a vehicle speed memory unit which stores a determined vehicle speed at a prior predetermined time and the present determined vehicle speed;

- a deceleration pulse interval calculating unit which calculates a pulse interval corresponding to a predetermined deceleration relative to the determined vehicle speed at the prior predetermined time stored by said vehicle speed memory unit;

- an undetermined vehicle speed calculating unit which calculates an undetermined vehicle speed from the elapsed time from the time the vehicle speed pulse signal is input[[ted]], measured by said elapsed time measuring unit, to the present time; and

- a rapid deceleration determining unit which determines rapid deceleration of the vehicle; wherein said rapid deceleration determining unit includes:

- a first rapid deceleration detecting section which compares the elapsed time measured by said elapsed time measuring unit with the pulse interval calculated by said deceleration pulse interval calculating unit, and determines rapid deceleration of the vehicle when the elapsed time is larger than the pulse interval; and

- a second rapid deceleration detecting section which, using the present determined vehicle speed stored by said vehicle speed memory unit, the undetermined vehicle speed calculated by said undetermined vehicle speed calculating unit, the elapsed time measured by said elapsed time measuring unit, and the present determined pulse interval based on which said present determined vehicle speed is calculated, calculates a deceleration representing the

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slope of a vehicle speed change by dividing the difference between the undetermined vehicle speed and present determined vehicle speed, by a time width calculated using the present determined pulse interval and said elapsed time, and determines rapid deceleration of the vehicle when the calculated deceleration has reached a predetermined threshold value; and wherein the rapid deceleration determining unit determines that the vehicle has rapidly decelerated, when at least one of said first rapid deceleration detecting section and second rapid deceleration detecting section determines rapid deceleration of the vehicle.

4. (Original) The vehicle rapid deceleration detecting device according to Claims 1, 2 or 3, comprising:

a control signal transmitting unit which transmits a control signal to a drive unit of said vehicle:

wherein said control signal transmitting unit transmits a control signal to said drive unit when rapid deceleration of the vehicle is determined by said rapid deceleration determining unit.

5. (Original) The vehicle rapid deceleration detecting device according to Claim 4, wherein:

said drive unit is a drive circuit which controls engaging or disengaging of a lockup clutch provided to an automatic transmission, and

said control signal transmitting unit transmits a control signal to said drive circuit to disengage the lockup clutch engaged, when rapid deceleration of the vehicle is determined by said rapid deceleration determining unit.

6. The vehicle rapid deceleration detecting device according to Claim 1, 2, or 3, wherein: said rapid deceleration determining unit determines the rapid deceleration of the vehicle when said calculated vehicle speed is within a predetermined set value range.

7. (Original) The vehicle rapid deceleration detecting device according to Claim 1, 2, or 3, comprising:

a brake sensor which detects ON/OFF of a vehicle brake;

wherein said rapid deceleration determining unit determines the rapid deceleration of the vehicle when ON of the vehicle brake is detected by said brake sensor.

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8. *(Original)* The vehicle rapid deceleration detecting device according to Claim 4, wherein:  
said rapid deceleration determining unit determines the rapid deceleration of the vehicle  
when said calculated vehicle speed is within a predetermined set value range.
9. *(Original)* The vehicle rapid deceleration detecting device according to Claim 5, wherein:  
said rapid deceleration determining unit determines the rapid deceleration of the vehicle  
when said calculated vehicle speed is within a predetermined set value range.
10. *(Original)* The vehicle rapid deceleration detecting device according to Claim 4, comprising:  
a brake sensor which detects ON/OFF of a vehicle brake;  
wherein said rapid deceleration determining unit determines the rapid deceleration of the  
vehicle when ON of the vehicle brake is detected by said brake sensor.
11. *(Original)* The vehicle rapid deceleration detecting device according to Claim 5, comprising:  
a brake sensor which detects ON/OFF of a vehicle brake;  
wherein said rapid deceleration determining unit determines the rapid deceleration of the  
vehicle when ON of the vehicle brake is detected by said brake sensor.
12. *(Original)* The vehicle rapid deceleration detecting device according to Claim 6, comprising:  
a brake sensor which detects ON/OFF of a vehicle brake;  
wherein said rapid deceleration determining unit determines the rapid deceleration of the  
vehicle when ON of the vehicle brake is detected by said brake sensor.
13. *(Original)* The vehicle rapid deceleration detecting device according to Claim 8, comprising:  
a brake sensor which detects ON/OFF of a vehicle brake;  
wherein said rapid deceleration determining unit determines the rapid deceleration of the  
vehicle when ON of the vehicle brake is detected by said brake sensor.
14. *(Original)* The vehicle rapid deceleration detecting device according to Claim 9, comprising:  
a brake sensor which detects ON/OFF of a vehicle brake;  
wherein said rapid deceleration determining unit determines the rapid deceleration of the  
vehicle when ON of the vehicle brake is detected by said brake sensor.